

WHAT IS CLAIMED IS:

1. A data processing method comprising the steps of:

5 arranging data in bytes in a matrix direction to form information data block;

constituting an outer parity with respect to 32k bytes unit of the information data block as an error correction code; and

10 further adding an overall error correcting code including the outer parity in the 62k byte unit of the information data block.

2. A data processing method, wherein:

15 digital data is processed in bytes to configure one information data block in $(M \times N)$ bytes of M rows \times N columns;

20 data is arranged in bytes in the information data block, so that data is arranged in the data transmission order from the 0th column to the $(N-1)$ -th column for each row while data is arranged in the data transmission order from the 0-th row to the $(M-1)$ -th row;

25 $(K \times M)$ rows \times N columns matrix block is further constructed which is a set of the information data block, and which is constituted of K information data blocks composed of information data blocks from the 0-th information data block to the $(K-1)$ -th information data block which continue in the data transmission

order;

on each column of $(K \times N)$ bytes of the matrix block, an error-correcting word $PO-b\{(K/2) \times Q \text{ bytes}\}$ is created with respect to the $(K/2) \times (m_i + m_j)$ bytes which is constituted by aggregating the even-number rows and the odd-number rows specified in the K information data block order, and an error-correcting word $PO-b\{(K/2) \times Q\}$ bytes is created with respect to the $(K/2) \times (m_j + m_i)$ bytes which is constituted by aggregating the remaining even-number rows and the odd-number rows specified in the K information data blocks;

$PO-a$ and $PO-b$ are scattered and arranged into K information data blocks constituted of $(M \times N)$ bytes of N rows and N columns so that

each column of N columns is formed as two sets of Reed-Solomon code PO of $(K/2) \times (m_i + m_j) + Q$ bytes and $(K/2) \times (m_j + m_i) + Q$ bytes (however, $M = m_i$ (the number of even-number rows) + m_j (the number of odd-number rows) and (Q is an integer of 1 or more)); and

the error-correcting word of P bytes is further added for each row of N bytes;

whereby as an overall block an error-correcting product code block is realized which constitutes $(K \times (M + Q)) \times (N + F)$ or $(K \times (M + 2Q) \times (N + P))$ bytes Reed-Solomon error-correcting word having K information data block of $(K \times M \times N)$ bytes as information portion.

3. The processing method according to claim 2,
wherein when M is an even number, and Q is 1,

the even number rows of the even-number-th
information data block and the odd-number rows of the
5 odd-number-th information data block are aggregated to
create the PO-a while

the odd number rows of the even-number-th
information data block and the even number rows of the
odd-number-th information data block are aggregated to
10 25 create PO-b.

4. The data processing method according to
claim 2, wherein when Q is 2 or more, and the M is an
even number, the even number rows of the even-number-th
information data blocks and the odd-number rows of the
15 odd-number-th information data blocks are aggregated to
create the PO-a while

the odd number rows of the even-number-th
information data blocks and the even number rows of the
odd-number-th information data blocks are aggregated to
20 create PO-b.

5. The data processing method according to
claim 2, wherein when Q is 2 or more and M is an even
number, the even-number rows of all the information
data blocks are aggregated to create the PO-a while the
25 odd-number rows of all the information data blocks are
aggregated to create the PO-b.

6. A data processing apparatus, wherein:

digital data is processed in bytes to configure one information data block in $(M \times N)$ bytes of M rows and N columns;

5 data is arranged in bytes in the information data block, so that data is arranged in the data transmission order from the 0th column to the $(N-1)$ -th column for each row while data is arranged in the data transmission order from the 0-th row to the $(M-1)$ -th row;

10 $(K \times M)$ rows \times N columns matrix block is further constructed which is a set of the information data block, and which is constituted of K information data blocks composed of information data blocks from the 0th information data block to the $(K-1)$ -th information data block which continue in the data transmission order;

15 on each column of $(K \times N)$ bytes of the matrix block, an error-correcting word $PO-a\{(K/2) \times Q \text{ bytes}\}$ is created with respect to the $(k/2) \times (m_i + m_j)$ bytes which is constituted by aggregating the even-number rows and the odd-number rows specified in the K information data block order, and an error-correcting word $PO-b\{(K/2) \times Q\}$ bytes is created with respect to the $(K/2) \times (m_j + m_i)$ bytes which is constituted by aggregating the remaining even-number rows and the odd-number rows specified in the K information data blocks;

25 $PO-a$ and $PO-b$ are scattered and arranged into K information data blocks constituted of $(M \times N)$ bytes of

M rows and N columns so that

each column of N columns is formed as two sets of
Reed-Solomon code PO of $(K/2) \times (m_i + m_j) + Q$ bytes
and $(K/2) \times (m_j + m_i) + Q$ bytes (however, $M = m_i$ (the
5 number of even-number rows) + m_j (the number of odd-
number rows) and (Q is an integer of 1 or more)); and

the error-correcting word of P bytes is further
added for each row of N bytes;

whereby as an overall block an error-correcting
10 product code block is realized which constitutes
 $(K \times (M + Q) \times (N + P))$ or $(K \times (M + 2Q) \times$
 $(N + P))$ bytes Reed-Solomon error-correcting word
having K information data blocks of $(K \times M \times N)$ bytes
as information portion.

15 7. A recording medium, wherein an error-
correcting product code is recorded with the data
processing method according to claim 1 or 2.

8. A data processing apparatus comprising a step
of transmitting an error-correcting product code
20 constructed with the data processing method according
to claim 1 or 2.

9. A data reproducing method comprising the steps
of:

receiving an error-correcting constructed with the
25 15 data processing method according to claim 1 or 2;

subjecting the block to rearrangement of rows of
the blocks; and

forming the rows to a set of rows in which two sets of Reed-Solomon codes PO are created to carry out each set of error correcting process.

10. A data reproducing apparatus comprising:

5 error-correcting means for carrying out each set of error correcting process by receiving the error correcting product code which is constructed in the data processing method according to claim 1 or 2; and

10 means for reproducing each row that has been processed with the error processing means at the arrangement position at the time of the error-correcting product code block.